Small Business Innovation Research/Small Business Tech Transfer

Superconducting Thin-Film Interconnects for Cryogenic Photon Detector Arrays, Phase I

Completed Technology Project (2005 - 2005)

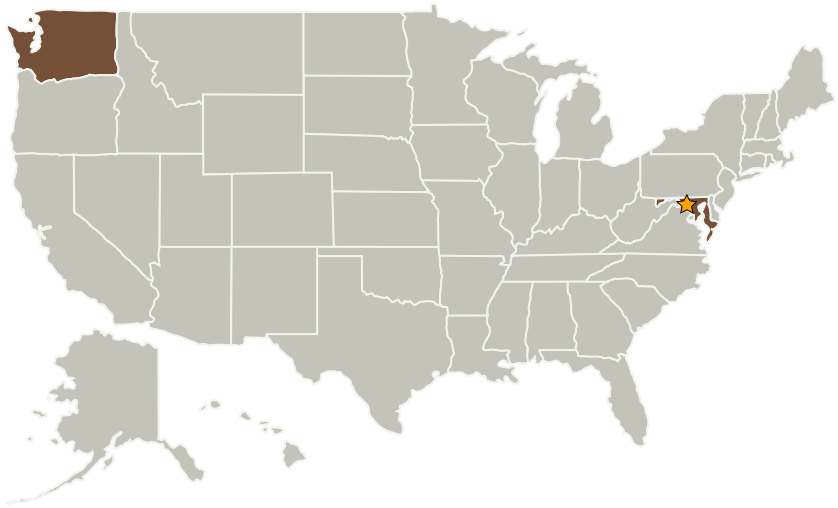
Project Introduction

Advanced imaging spectrometers for x-ray astronomy will require significant improvements in the high density interconnects between the detector arrays and the first stage electronics. These detectors operate at 50 to 100 mK, while the first stage is held between 1.3-1.5 K. Interconnects are needed that provide the required signal paths while imparting a thermal heat load on the detector stage of less than 0.5 microwatts. The innovation proposed to meet this need is a ribbon of ultra-thin polyimide supporting a high-density array of vacuum deposited superconducting traces. No such innovative high-density interconnects are available today. Phase I will test material properties of superconducting thin films fundamental to interconnect performance and prepare prototype devices that demonstrate the feasibility of this approach.

Anticipated Benefits

Technologies for medical imaging, lithographic inspection, and the non-destructive evaluation of structural materials are increasingly adopting cryogenic detectors and microcalorimeters. These applications require signal interconnections across varied thermal environments. The proposed interconnects will find use in quality assurance instrumentation for electronics packaging, medical imaging such as NMR and MRI, NDE of aircraft lap joints, and in microcalorimeter spectrometers used with scanning electron microscopes for microanalysis of thin films and MEMs devices.

Primary U.S. Work Locations and Key Partners



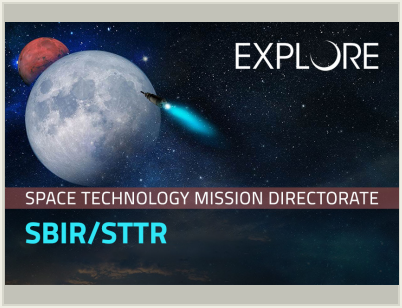


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Table of Contents

Project Introduction	1
Anticipated Benefits	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Luxel Corporation	Supporting Organization	Industry Small Disadvantaged Business (SDB)	Friday Harbor, Washington

Primary U.S. Work Locations	
Maryland	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Manager:

Christine Allen

Principal Investigator:

David B Grove

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes